

APPLICATION

FOR

UNITED STATES LETTERS PATENT

FOR

RETAINER DEVICE FOR FREE LOOSE ENDS OF TIGHTENING
OR FASTENING STRAPS OR BELTS, OR THE LIKE, PARTICULARLY
IN ARTICLES FOR WEARING, AND BUOYANCY COMPENSATOR VEST
HAVING SUCH A DEVICE

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RETAINER DEVICE FOR FREE LOOSE ENDS OF TIGHTENING OR
FASTENING STRAPS OR BELTS, OR THE LIKE, PARTICULARLY IN
ARTICLES FOR WEARING, AND BUOYANCY COMPENSATOR VEST
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Retainer device for free loose ends of tightening or
fastening straps or belts, or the like, particularly in
articles for wearing, and buoyancy compensator vest
having such a device

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The invention relates to a device for retaining
free loose ends of tightening or fastening straps or
belts, or the like, particularly in articles for
wearing, wherein said free end is a part of a strap or
15 belt segment which is secured by the other end to a
first part of the article, which first part is designed
to be connected to a second part of the article, by
said strap or belt segment, said second part being
connected in an intermediate portion of the strap or
20 belt segment, whereby said strap or belt segment is
divided into a portion for connecting the two parts of
the article, and a free loose portion.

The above condition is frequently found in all
those articles for wearing, particularly in sportswear,
25 which have adjustment or tightening belts and/or
harnesses. The loose portion of the straps, beyond the
tightening or fastening portion, may sometimes cause
trouble, particularly in harnesses for scuba buoyancy
compensators. As is known, a buoyancy compensator vest
30 typically consists of an inflatable bladder, which is
fastened by means of harnesses and a waist belt. Each
harness typically includes a strap segment which is

permanently anchored by one end thereof to a portion of the vest waist. This strap typically has a buckle in an intermediate point of its length, for connection to a padded portion of the harness which corresponds to the shoulder of a user. The loose portion of the strap, which extends downwards from said buckle, when the diver is in a standing position, may be grasped by the user to tighten the harness. To this end, at each free loose end of each strap of each harness, a ring-like tightener is provided, which improves finishing and allows an easier grasp even when thick neoprene gloves are used. During diving, this loose portion of the strap may be dangerous, as the ring may get entangled or hit the mask glass, or anyway cause disturbance in an inherently difficult situation.

In order to obviate this drawback, certain types of buoyancy compensators have two waist pockets, each for receiving one free loose end of the strap of each harness, to prevent the latter from causing trouble during diving. Nevertheless, when the harness needs to be adjusted while diving, this free end is to be extracted from the pockets to be grasped, which may not be an easy operation, particularly when the diver wears thick diving gloves.

Therefore, this invention has the object of obviating the above drawbacks and allowing, by simple and inexpensive means, to provide an article for wearing, particularly a buoyancy compensator vest for underwater diving, wherein the free loose ends of harnesses or other belts may be secured in such a manner that they are of no hindrance upon diving, while being easily reachable by the user for adjustment

purposes. Yet, as is better explained below, the object of this invention is to solve the problem of securing the free loose ends of tightening or fastening straps or belts in a much wider range of articles, particularly sportswear, such as backpacks, pouches, bags or the like.

The invention achieves the above purposes thanks to the fact that the above mentioned strap or belt segment is connected to the first part of the article in a permanent manner, a widened member being provided for fastening and retaining an end of the strap segment to the corresponding first part, which member has an opening through which the other free loose end of the strap or belt segment passes and is retained.

In accordance with a first arrangement, the opening of the widened fastener and retainer member may be such that, when the free loose end of the strap or belt segment is inserted in the opening, it causes this free loose end to pass from one side of the connecting portion of the strap or belt segment to the opposite side of said connecting portion of the strap or belt segment.

Alternatively, this opening may be such that, when the free loose end of the strap or belt segment is inserted therein, the whole free loose portion is situated on one side of the connecting portion of the strap or belt segment.

This opening may either be substantially on the same plane as the two faces of the connecting portion of the strap or belt segment, or extend transverse, particularly perpendicular, to the longitudinal extension of this connecting portion of the strap or

belt segment.

The widened fastener and retainer member may be the first part itself, whereto an end of the strap or belt segment is fixed. In a buoyancy compensator vest, 5 the waist portion of the vest may have, for instance, a slit or slot, wherein the user may insert the free loose end of the strap.

Alternatively, the widened fastener and retainer member may coincide with the widened fastening end of 10 the strap or belt segment. Back to the buoyancy compensator vest, the strap may be arranged to have an increasing width toward the end for connection to the waist portion of the vest, at least for the portion in the proximity thereof, in which portion a transverse 15 slot may be provided, in which the user may introduce the free loose end of the strap segment.

Nevertheless, according to a preferred embodiment of the invention, this widened fastener and retainer member may be a ring that is fixed to the first part of 20 the article along a portion of its circumference while, along the opposite portion of its circumference it is fastened to an end of the strap or belt segment.

In accordance with a preferred embodiment of the invention, this ring may have an elongated shape in a 25 direction transverse to the longitudinal extension of the connecting portion of the strap or belt segment. The ring may be composed of a pair of longitudinal parallel branches, one of which is fastened to the first part of the article whereas the other is fastened 30 to the end of the strap or belt segment. These two branches are joined together at each pair of corresponding ends by a portion that is particularly

substantially semicircular or substantially straight.

The fastening end of the strap or belt segment may have a portion that is bent back and sewn on itself as a hem, that encircles a longitudinal branch of the elongated ring.

The elongated ring may be secured to the first part of the article by means of a strap or belt segment which is fixed, and particularly sewn, by one end, to the first part of the article, whereas at the opposite end it has a portion that is bent back and sewn on itself as a hem which encircles the other longitudinal branch of the elongated ring.

The strap or belt segment that secures the elongated ring to the first part of the article may have such a length that the ring is situated near the edge of this first part. In this case, the seam of the hem may advantageously correspond to the seam whereby the strap is secured to the first part of the article. Alternatively, it may be longer and such that the elongated ring is situated in an intermediate position between the first and second part of the article.

According to a preferred embodiment, that will be described in greater detail in the description of the drawings, at least one, but preferably both longitudinal branches of the elongated ring may have an intermediate longitudinal slit, which divides the branches into two parallel longitudinal portions, one of which, preferably the external portion, is respectively encircled by the hem at the fastening end of the strap or belt segment and by the hem at the end of the strap or belt segment which is designed to secure the elongated ring to the first part of the

article. This avoids the presence of other strap portions, when the free loose end of the strap passes in or out of the ring, and prevents any mutual interference.

5 According to an improvement, at least one, particularly both longitudinal branches of the elongated ring may have two parallel longitudinal slits, which divide the branches into three longitudinal parallel portions, one of which, preferably the intermediate portion, is respectively encircled by the hem at the fastening end of the strap or belt segment and by the hem at the end of the strap or belt segment which is designed to secure the elongated ring to the first part of the article.

15 According to yet another improvement, at least one, but preferably both longitudinal portions respectively encircled by the two hems, may have an opening, particularly an intermediate opening, for insertion of the branch inside its respective hem. Thanks to this arrangement, the ring may be secured when the hem has already been sewn, in a separate processing step, and more advantageously, if the ring is broken, it can be replaced without having to unpick the hem.

25 The opening may be relatively short as compared with the total longitudinal extension of the portion encircled by the hem and of the hem itself, so as to allow the introduction of the ring portion with the intermediate opening inside the hem, while preventing this portion from accidentally coming out of the hem.

30 Regardless of the embodiment being implemented, means may be provided for preventing the free loose end

of the strap from accidentally coming out of the opening of the widened fastener and retainer member, when it is inserted therein.

As mentioned above, the free loose end of the
5 strap may have manual grasping means for easily tightening and/or fastening the strap which, in the case of the buoyancy compensator harness, typically consist of a D-ring, whose straight portion is secured to the free loose end of the strap segment.

10 As a result, the elongated ring may have such a shape as to be narrow in the middle and widened at the opposite ends, particularly toward the fastening end of the strap or belt segment, in such a manner that the longitudinal branch facing toward this fastening end of
15 the strap or belt segment or the innermost branch thereof, has an intermediate portion that is arched in the direction of the opposite longitudinal branch, which may yield upon insertion of the D-ring in the elongated ring or upon intentional extraction of this
20 D-ring from the elongated ring, and forms an intermediate retaining narrowed portion to prevent the free end of the strap or belt segment with the D-ring from accidentally coming out.

In a second embodiment of the invention, the
25 elongated ring may have a third branch, which is parallel to the two longitudinal branches and substantially intermediate therebetween, for connecting the two opposite joining portions at each pair of corresponding ends, in such a manner as to divide the
30 central opening of the elongated ring into two elongated openings. By this arrangement, the free loose end of the strap or belt segment may be introduced in

the opening closer to the fastening end of the strap or belt segment by one of the sides of the connecting portion of the strap or belt segment and extracted from the other opening on the same side of the connecting
5 portion of the strap or belt segment.

In accordance with an improvement, the third branch of the elongated ring may extend in a slightly raised position with respect to the plane of the elongated ring, thereby forming a bridge, to facilitate
10 the introduction of the free loose end of the strap or belt segment in the pocket formed by said third branch.

According to yet another improvement, the third branch of the elongated ring may have an opening, particularly an intermediate opening, to facilitate the
15 introduction of the free loose end of the strap or belt segment beneath the bridge formed by said third branch.

The elongated ring may be made of a relatively rigid material, particularly nylon, metal or the like.

According to a third embodiment, the widened
20 fastener and retainer member may consist of a fastening plate which is secured by one edge to the first part of the article, by sewing and/or chemical-physical adhesion and/or the like, whereas it is secured by the opposite edge and still by sewing and/or chemical-
25 physical adhesion and/or the like, to the fastening end of the strap or belt segment.

This fastening plate may substantially have the shape of a trapezium, particularly an isosceles trapezium, with the greater base corresponding to the
30 edge secured to the first part of the article, particularly the waist portion of the buoyancy compensator vest, and the smaller base corresponding to

the edge secured to the strap or belt segment. The opening for receiving the free loose end of the strap or belt segment may be an elongated slot extending parallel to the two bases and in an intermediate position therebetween, particularly near the greater base, and is substantially as long as the strap segment is wide.

Advantageously, the fastening plate may be made of a relatively rigid material such as metal, leather, thick fabric, or the like. According to a preferred arrangement, the plate may be made of a plastic material and have such a thickness as to be relatively resilient, to be elastically deformable by the user's manual pressure of at least the slot edge facing toward the edge secured to the strap segment end, to allow and/or facilitate the passage inside the slot of the other free loose end of the strap or belt segment. The slot may have a width greater than or equal to the thickness of the strap segment, but preferably slightly lower than it, so that the two longitudinal edges of this slot exert a retention action, to prevent the free loose end of the strap segment from accidentally coming out of the slot when it is inserted therein.

The slot may have such a size as to allow an easy passage of the D-ring, particularly it may be narrow in the middle and widened at the opposite ends, particularly toward the fastening edge of the strap segment, in such a manner that the slot edge facing toward the fastening end of the strap segment has an intermediate tongue that is designed to yield upon insertion of the D-ring in the slot or upon intentional extraction of the D-ring from the slot, and forms an

intermediate retaining narrowed portion, to prevent the free end of the strap segment with the D-ring from accidentally coming out of the slot.

Regardless of the embodiment being implemented, 5 the strap or belt segment may be connected to the second part, particularly in the case of harnesses, by buckle means, in such a manner as to adjust the position of these buckle means along the longitudinal extension of the strap or belt segment, to allow the 10 strap or belt segment to be tightened and/or fastened, and in this specific case to allow harness length adjustment.

Advantageously, the strap or belt segment may be connected to a first buckle part, which is engaged, 15 particularly snap-fitted, with a second buckle part associated to the second part of the article, particularly the padded harness portion, in such a manner that the first and second part of the article are connected in a removable manner. In the particular 20 case of the buoyancy compensator vest, this arrangement allows the padded portion to be detached from the waist portion of the vest to facilitate wearing/removal thereof.

The buckle or the second buckle part may be 25 connected to the second part of the article in an indirect manner, i.e. by means of a second strap or belt segment, particularly to adjust its position along the longitudinal extension of said second strap or belt segment. The end of the second strap or belt segment 30 which secures it to the second part may advantageously be itself equipped with a retainer device as described in one of the above embodiments. Back to the buoyancy

compensator vest, this invention may also find an advantageous application with reference to the two free loose strap portions that typically project in two opposite directions from an intermediate buckle of the waist belt and are manually tightened by the diver for belt adjustment. The end of each strap segment that forms the belt, to be secured to the waist of the vest may be equipped with a device as described in one of the above embodiments, in which each free loose end of the strap is to be introduced to prevent it from causing trouble during diving.

The advantages of the invention are self-evident from the above disclosure, particularly when the invention is used for a diving buoyancy compensator vest. In the first and third embodiments, the free loose ends of each harness may be easily introduced in their respective elongated rings or slots provided in their respective fastening plates to be passed directly inside the vest, so as to cause no trouble during diving. Also, when the harness needs to be tightened, the user may easily introduce a hand in his/her vest and tighten the harness without having to extract the free end of the strap from the elongated ring or the slot. In the second embodiment, the free loose end of the strap or belt is also effectively secured, and be easily reachable by a hand, as it is wholly outside the vest.

Further characteristics and improvements will form the subject of the dependent claims.

The characteristics of the invention and the advantages derived therefrom will be more apparent from the following detailed description of the annexed

drawings, in which:

Figure 1 is a perspective view of a buoyancy compensator vest for underwater diving, having a device according to the invention and particularly a device as
5 shown in Figures 6 and 7.

Figs. 2 to 4 show the harness portion of the vest as shown in Fig. 1 according to a first embodiment of the inventive device.

Fig. 5 shows a second embodiment of a device
10 according to the invention.

Fig. 6 shows a third embodiment of a device according to the invention.

Fig. 7 shows the device of Fig. 6 with the free loose end of the strap introduced in the device.

Fig. 8 shows a detail of a harness equipped with an inventive device according to a fourth embodiment.
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Fig. 9 shows the harness portion of Fig. 8, equipped with an inventive device according to a fourth embodiment.

Fig. 10 shows the area of a harness or a general tightening strap, having a novel ring-like tightener.
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Fig. 11 shows an enlarged detail of the D-ring that is fitted onto the strap end.

Fig. 12 shows the area in which the ring-like tightener is engaged with the free loose end of the strap of a harness or a general tightening strap.
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Fig. 13 shows that the D-ring that is used in Figures 10 to 12.

Referring to the figures, a buoyancy compensator vest for underwater diving typically includes an inflatable bladder that is worn and secured to the user's trunk by means of two harnesses 2 and at least
30

one front waist belt 3. Each harness 2 has a padded portion 102 that corresponds to a shoulder when the vest is worn by a user. The padded portion 102 has a buckle 4 at the front for connecting and tightening a strap segment 5 which is fastened at one end to a waist portion 101 of the bladder 1. The portion of the buckle 4 designed for connection to the strap 5 has an end with two longitudinal openings 104, 204 disposed transverse to the longitudinal extension of the strap segment 5 and are separated by a member 304. First, the free end of the strap segment 5 is passed in the opening 104 closer to the padded portion 102 of the harness 2 from the inside of the buckle 4, then it is guided around the member 304 and further inserted in the other opening 204 so that the strap segment 5 is divided into two portions, one of which 105 is used to connect the waist 101 of the bladder 1 to the buckle 4, therefore to the padded portion 102 of the harness 2, and the other 205 projects from the front side, when the vest is worn by a standing user, so that it can be grasped by a hand and tightened to adjust the harness 2. In order to facilitate grasping, a ring 6 is provided at the free end of the portion 205 of the strap 5, particularly a rectangular or a D-ring, which is typically made of plastic or stainless steel, in which the user may insert a thumb even when he wears thick neoprene gloves. The above described fastening portion of the buckle 4 may be part of a one-piece buckle 4 which is directly secured, at the edge opposite to the one for connection to the strap 5, to the padded portion 102 of the harness 2, for instance by sewing. As an alternative, this fastening portion of

the buckle 4 may be a part of a male member 404, which has engagement/release means, particularly by snap engagement, in a female member 504, which is in turn secured to the padded portion 102 of the harness 2. The
5 above buckle types are both widely known and used in sportswear and equipment, such as backpacks or the like. Nevertheless, any other fastener or tightener buckle may be used, or the male part 404 and the female part 504 of the buckle 4 may be simply disposed in
10 reversed positions.

The end of the strap 5 to be secured to the waist 101 of the bladder 1 has a member for securing the strap 5 to the bladder 1, whose representation in Figure 1 refers to Figures 6 and 7, and consists of a
15 plate 7 with a slot for the passage of the D-ring and of the loose end of the associated strap whereto this ring is attached.

The content of Figure 1 shall be intended without limitation, as any of the above described embodiments
20 may be used instead of the plate 7.

The simplest embodiment is a ring 8 with an elongated shape in a direction transverse to the longitudinal extension of the connecting portion 105 of the strap or belt segment 5. The ring 8 may be made of
25 a simple elongated ring with rounded or rectangular ends, as shown in Figures 2 to 4. The longitudinal extension of the opening may be longer than the transverse extension of the D-ring, designated with numeral 6, or the diagonal extension may be longer than
30 the D-ring 6, so as to advantageously allow the passage of the D-ring 6 through the elongated opening of the ring 8, while preventing the D-ring 6 from passing in a

position parallel to the longitudinal median axis of the ring 8 as clearly shown in Figures 3 and 4. The ring 8 is composed of a pair of parallel longitudinal branches 308, which are interconnected at each pair of corresponding ends by a portion 208 that may be substantially semicircular, polygonal or straight.

Here, each of the two longer branches 308 is engaged in a hem 305 provided at the fastening end of the strap segment 5 and in a hem 9 formed by a short length of strap folded on itself and sewn onto the edge of the waist 101 of the bladder 1.

Figure 5 shows a variant of the embodiment as shown in Figures 2 to 4. Here, the shorter branches are arched, and more precisely semicircular, and each of the two longitudinal branches 308 of the ring 8 has a longitudinal intermediate slot 108 which divides it into two branches, the outermost of which may be encircled respectively by a hem 305 provided at the fastening end of the strap segment 5 and by a hem 9 formed by a short length of the strap folded on itself and sewn onto the upper edge of the waist 101 of the bladder 1. As is clearly shown in the Figures, the free loose end 205 of the strap 5, ending with the D-ring 6, may be easily introduced from the outside into the elongated ring 8 and directly passed into the bladder 1 to prevent it from causing trouble during diving.

In all the above embodiments, for any adjustment requirement, the diver need only introduce his/her hand into the bladder 1 and tighten the strap without being forced to extract the free portion 205 out of the bladder.

The third embodiment of the invention, as shown in

Figures 8 and 9 differs from the previous embodiments for the fact that it has a ring 10, itself having an elongated shape in a direction transverse to the connecting portion 105 of the strap 5, which has a substantially rectangular shape. In an intermediate position between the two longer longitudinal branches 110 and parallel thereto, this ring has a third branch which is joined at its opposite ends to the shorter branches 201 of the ring 10, at an intermediate point therebetween. This third branch has an intermediate opening, which divides it into two segments 310, extending in a slightly raised position with respect to the plane defined by the ring 10, so as to form a pocket in which it may receive the free loose portion 205 of the strap 5 with the D-ring 6. As is apparent from the Figures, in this case the D-ring remains outside the bladder 1 and may be easily reached by a hand to adjust the strap 5, whereas the portion 205 of the strap 5 remains engaged therein and is of no hindrance during diving. Obviously, the above arrangement of hems 305, 9 may be also used for this second hem fastening embodiment, with each hem directly encircling a longitudinal branch 110 of the ring 10. Alternatively, the arrangement of the first embodiment may be used, which provides at least one longitudinal slit in an intermediate position of each of the branches 110. This second embodiment may be particularly suitable for harnesses of backpacks.

A fourth embodiment of the inventive device consists of a fastening plate 7, particularly having the shape of an isosceles trapezium which is secured to the upper edge of the waist portion 101 of the bladder

by the greater base, by sewing or the like, and is secured to an end of the strap segment 5 by the smaller base 207, still by sewing or the like. At the edge 107, the plate 7 has a slot 307 which extends parallel to the edge 107 and transverse to the longitudinal extension of the strap segment 5. During use, the free loose end of the portion 205 of the strap 5, beyond the buckle 4, which might cause trouble during diving, may be easily introduced in the slot 307 and passed into the vest, as indicated by the arrow, where it is easily reachable by the hand of the user to be possibly further tightened from the inside of the vest, without requiring to be extracted out of the vest. The edge of the slot 307 facing the shorter base 207 has an intermediate tongue 407 formed by an intermediate narrower portion of the slot 307, which tongue 407 may yield upon passage of the ring-like tightener 6, whereby it has the function of preventing any accidental extraction of this ring-like tightener 6. To this end, the plate 7 may be made of a relatively rigid and elastic material, particularly plastic. Thanks to this arrangement, the free ends of the straps 5 of the harnesses 2 are safely held inside the bladder 1, in a position that is easily reachable by the user.

It shall be noted that the above described embodiments shall be intended without limitation, as preferred examples, the device addressed by the invention being also advantageously applicable, for instance, to the waist belt 3 or other belts of the vest. In fact, the waist belt 3 itself has at least one free loose strap portion 103, but typically two free portions 103 which are tightened by the user from

opposite sides, to adjust the belt 3. A device as described in one of the above embodiments may be provided at each opposite area in which the belt 3 is secured to the two waist and side portions 101 of the bladder 1, allowing to pass the free loose ends of the belt 3 into the bladder or simply to secure them. The field of application of the invention itself shall not be limited to the buoyancy compensator vest for underwater diving, as the invention may find advantageous applications in straps or belts for tightening several types of articles, particularly sportswear, such as backpacks, pouches, bags, or the like. The above embodiments themselves shall be intended without limitation, as the guiding principle of this invention is applicable to a variety of embodiments. As a mere example, the connecting strap may be a segment of a string or the like or a fastening member may be provided, which has a circular aperture for receiving the free loose end of this string segment, which may possibly have a ball-like grasp member with a slightly greater diameter than the aperture, which member may be introduced therein thanks to the resilience of the edge of the aperture, which has the additional function to prevent it from being accidentally extracted therefrom.

Back to the Figures, and with particular reference to Figures 10 to 13, each D-ring 6 is fastened to the free end of its respective portion 205 of the strap 5 by wrapping the latter around the straight portion 106 of the D-ring 6, by bending it back on itself and sewing it, to form a hem 305 for receiving this straight portion 106 of the D-ring 6. In certain

conditions, particularly when the D-ring 6 needs to be replaced, this arrangement is very uncomfortable, as the hem 305 is to be unpicked and sewn each time. According to another characteristic of the invention, these D-rings 6 may be made in such a manner that they do not need to be mounted before sewing the end of the portion 205 of the strap 5 on itself to form the hem 305. To this end, the invention proposes a novel D-ring wherein, in an intermediate position between the straight portion 106 of the D-ring and the opposite side of the ring 6, particularly adjacent to said straight portion 106 and at a slightly greater distance with respect to the thickness of the strap 5, a segment is provided that is divided into two portions by an intermediate opening for insertion into the hem 305 which opening is relatively short as compared with the whole length of the hem 305. By this arrangement, the D-ring 6 may be fastened to the end of the strap 5 when the hem 305 has already been sewn, which allows a considerable simplification as regards construction. Moreover, the replacement of D-rings does not require hems 305 to be unpicked, and special tools to be used. Here, the straight portion 106 of the ring 6 has the function of providing the ring 6 with a certain rigidity and however, in certain cases, the opening for insertion into the hem 305 may be situated in an intermediate position of the straight portion 106. The above arrangement may be obviously be advantageously used for buckle fastening ends or the like. It may be particularly used for one of the two elongated ring embodiments and possibly even to the trapezoidal plate, which may have the fastening characteristics of the D-

ring. With particular reference to the embodiment of the elongated ring 8, the broken portion may be either the outermost or the innermost delimiting portion of the slot 108. In the first case, an additional bracket
5 or U-shaped segment may be connected to the ring from the outside, which has the same stiffening function as the member 106 of the ring 6. In the second case, the function of the member 106 is accomplished by the outermost delimiting portion of the slot 108. The above
10 may be provided as regards the attachment of the ring 8 both to the hem 305 and to the hem 9.

Obviously, the invention is not limited to the embodiments described and illustrated herein, but may be greatly varied, both as regards construction and
15 with reference to the field of application, without departure from the guiding principle disclosed above and claimed below.